APPLICATION UNDER UNITED STATES PATENT LAWS

Invention: **SHORT MESSAGING SERVICE CENTER MOBILE-ORIGINATED TO INTERNET COMMUNICATIONS**

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This is a:

[ ] Provisional Application

[X] Regular Utility Application

[ ] Continuing Application

[ ] PCT National Phase Application

[ ] Design Application

[ ] Reissue Application

[ ] Plant Application

SPECIFICATION

SHORT MESSAGING SERVICE CENTER MOBILE-ORIGINATED TO HTTP INTERNET COMMUNICATIONS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to communications networks. More particularly, it relates to the communication between a mobile (i.e., wireless) device and an application server via a short message service center (SMSC) and the Internet.

2. Background of Related Art

Wireless communication services are in increasing demand in response to a society which is becoming increasingly mobile. Traditionally, wireless communication services include voice cellular phone and paging services in which a user can make a telephone call or send/receive a page including a numeric message indicating a telephone number over a wireless network. More recently, paging services have been expanded to offer alphanumeric paging, which allows a short text based message to be sent to and displayed at a handheld pager.

However, voice cellular telephone and the paging services each require an intended subscriber to be on-line or active to receive a telephone call or transmitted paging message. In other words, these services do not typically offer the capability of storing the messages for a temporarily unavailable subscriber.

In the early 1990s, as a result of the growing popularity of digital wireless technology, a standard for digital wireless networks was introduced in Europe. That standard, now known as the global standard for mobiles (GSM), included a service called short messaging service (SMS). An SMS allows transmission of short messages, typically up to 160 characters, to and from communication devices, e.g., cellular telephone handsets, telephones or computers with appropriate modems.

In North America, the SMS is currently implemented on digital wireless/mobile networks, such as a PCS network based on the GSM standard, code division multiple access (CDMA) and/or time division multiple access (TDMA) methods. Short message services are gaining in popularity, particularly in the United States.

Short message services are advantageous over text based paging services because of the capability of bi-directional communication. Such bi-directional communication allows, for example, notification to the originating device of the success or failure of the short message delivery.

Each SMS network typically includes a short message service center (SMSC) which acts as a store-and-forward mechanism providing guaranteed delivery of short messages to a subscriber, even if the subscriber is inactive when the message was transmitted, by delivering the short messages once the subscriber becomes active. Delivery of all short messages is guaranteed regardless of whether or not the intended subscriber is "on-line" because the transmitted short message is stored within the SMS network and delivered to the intended subscriber from their assigned SMSC when the subscriber becomes available.

A variety of services have been introduced using SMS networks including, for example, integrated electronic mail and fax, integrated paging, interactive banking, and information services such as stock quotes and airline schedule delivery.

In operation, an SMSC receives a short message from any source intended to be delivered to a particular subscriber. When the intended subscriber is not available because, for example, it is turned off or is outside of the service area of the SMS network, the attempt to deliver the short message at that time will fail. In this case, the short message will be retained in the SMS network for a later delivery attempt. Thereafter, when the subscriber finally becomes available, e.g., is turned

on or has moved into the service area of the SMS network, the relevant portions of the network (e.g., the mobile servicing center (MSC) and the home location register (HLR)) notify the SMSC to initiate delivery of the stored (i.e., previously failed) short messages.

Fig. 6 shows an exemplary structure of a SMS network **500**. Although the following example is described using terms and protocols mainly as defined by the North American standard IS-41, it will be apparent to one skilled in the art that the example is applicable to any networks that offer store-and-forward type short message service.

IN5 A1

The SMS network **500** typically includes one short message service center (SMSC) **501**. The SMSC **501** typically includes a storage subsystem to store short messages that had failed to be delivered. The SMSC **501** typically further includes various interfaces (not shown) to receive short messages originating from various sources and protocols, such as a Voice Mail System (VMS) **508**, paging networks using, e.g., Telocator Numeric Paging Protocol (TNPP) **509**, devices using the Short Message Peer-to-Peer (SMPP) protocol **510** via TCP/IP, e-mail systems using the Simple Mail Transport Protocol (SMTP) **511**, and/or devices using the Telocator Alphanumeric Protocol (TAP) **512**. Some of the various sources of the short messages may be gateways to other networks.

The SMSC **501** may further include a gateway/interworking block (not shown) that enables the SMSC **501** to communicate with the rest of the SMS network **500**, such as a Home Location Register (HLR) **503** or a Mobile Switching Center (MSC) **505**, using the Signaling System No. 7 (SS7) **502**. The methods and mechanism of communication in the SMS network **500** are defined by the mobile application part (MAP) layer, which uses the services of the SS7 transaction capabilities application part (TCAP) as the signaling infrastructure of the SMS network **500**. The protocol for the signaling is referred to as the IS-41 protocol under the

American standard as published by the Telecommunication Industry Association (TIA) or as the GSM MAP under the European standard published by European Telecommunication Standards Institute (ETSI).

The Home Location Register (HLR) **503** includes a database that permanently stores and manages subscriptions and service profiles of users having a subscription to the SMS network **500**. Although only one HLR **503** is shown, the SMS network **500** may include two or more HLRs. The SMS network **500** also typically includes several visitor location registers (VLR) **504.** A VLR **504** is a database temporarily holding information about visiting subscribers who move into its service area. Thus, a VLR **504** contains information regarding routing information for all subscribers within its service area, and informs the relevant HLR **503** of the availability and routing information regarding its subscribers. The mobile switching center (MSC) **505** obtains subscriber information from the VLR **504** to service visiting subscribers.

The mobile switching center (MSC) **505** performs switching and call control functions, and receives short messages from the SMSC **501** for delivery to the appropriate mobile subscriber **507** (shown, e.g., as a cellular phone handset). It is to be understood that, although only one MSC **505** is shown, the wireless network **500** may include two or more MSCs.

INS A2

The base station subsystem (BSS) **506** handles the wireless communications, e.g., RF transmission and reception of voice and data traffic, to and from the mobile subscriber **507**. The BSS **506** is typically composed mainly of two parts: the base transceiver station (BTS, not shown) which houses the radio transceivers that define a cell and handles the radio-link protocols with the mobile subscriber **507**, and the base station controller (BSC, also not shown) which manages the radio resources, and handles radio channel set up, frequency hopping, and handoffs (or handovers as is sometimes referred as). The BSC is the

interface between the MSC **505** and the subscriber **507**. The subscriber **507**, also sometimes referred to as a mobile station (MS), typically consists of mobile equipment (e.g., a cellular phone handset) preferably uniquely identifiable by an identifying number, e.g., mobile identification number (MIN), International mobile subscriber identification (IMSI) and/or electronic serial number (ESN), for the subscriber **507**. The mobile equipment may include a storage area, e.g., a flash memory, a ROM, a RAM or the like to hold the unique identifying number within the mobile equipment. In GSM networks, a smart card, typically referred to as a subscriber identity module (SIM) is utilized to store a unique identifying number.

Fig. 7 shows an exemplary flow of a short message through a conventional SMS network. Although Fig. 7 shows only an example of short message delivery to a mobile subscriber, it is to be understood that a mobile subscriber or any other sources may originate a short message. The flow of a mobile subscriber originated short message would involve similar processes as the following mobile subscriber terminated short message example, and would be apparent to one of ordinary skill in the art.

The SMSC **601** receives a short message intended for a subscriber **604** from a source of short message **605** which may be any one or more of the aforementioned sources of short messages, e.g., **508-512** of Fig. 6. Upon receiving a short message, the SMSC **601** sends a request for routing information, i.e., an SMS request (SMSREQ), to the HLR **602**. The HLR **602** maintains information regarding the availability of the intended subscriber **604** and the appropriate MSC **603** that services the intended subscriber, and sends the information as routing information **608** back to the SMSC **601**. The SMSC **601** forwards the short message to the appropriate MSC **603** using the routing information **608** received from the HLR **602**, for example, in accordance with the short message

delivery point-to-point (SMDPP) mechanism of IS-41 standard. The MSC **603** queries the VLR (not shown) for subscriber information. The VLR may perform a paging and authentication process, and sends the subscriber information to the MSC **603**. The MSC **603**, using the information received from the VLR, delivers the short message to the intended subscriber **604**, and sends a delivery report **612** to the SMSC **601**. The SMSC **601** may send the result of the delivery, i.e., the status report **613**, to the source of the short message **605** if requested.

When the attempted delivery of the short message has failed because, for instance, the intended user was out of the service area, or had his or her communication device turned off, the MSC **603** informs the HLR **602** of the failure. The HLR **602** then turns on an SMS notification indicator flag for the subscriber, and the SMSC **601** retains the failed message for a later delivery attempt.

Fig. 8 shows a pending short message delivery process in a conventional short message service network after the mobile subscriber becomes available for delivery of the retained messages. In particular, in Fig. 8, when the subscriber **704** turns his or her handset on or comes within the service area, the subscriber's handset sends a registration signal **709** to the MSC **703**. The registration signal **709** may or may not include authentication process.

Upon receiving the registration signal **709**, the MSC **703** informs the HLR **702** (or the VLR **711**) of the availability of the subscriber **704** by sending a subscriber available signal **708**. Because the SMS notification flag for the subscriber is on, the HLR **702** or the VLR **703** sends an SMS notification (SMSNOT) message **705** in case of networks implementing IS-41 standard, or an equivalent notification alerting the fact that the subscriber has become available in networks implemented in accordance with other standards, to the SMSC **701** assigned to service that particular intended subscriber **704**.

The SMSC **701** then sends a delivery request **706** to the MSC **703** via, for example, the SMDPP protocol in the IS-41 standard. The MSC **703** finally delivers the short message **710** to the subscriber **704**, and sends a message delivered message **707** back to the SMSC **701** to confirm and finalize the delivery of the short message. The SMSC **701** may further send a delivery report to the source of the short message if it was requested.

The Wireless Application Protocol (WAP) attempts to standardize a mechanism for two-way communications. However, WAP requires that a special browser be loaded on the handset, and requires the user to enter into a dedicated 'browser mode' in order to interact with 2-way services.

There is a need for a standardized solution allowing short message communications between wireless devices and application servers on the Internet without the need for a specialized browser, while making use of existing communication standards utilized by standard SMSCs, e.g., SMPP.

SUMMARY OF THE INVENTION

A3 In accordance with the principles of the present invention, a gateway comprises a first communication path to accept a short message from a short message service center. A translation module inserts the short message into an HTTP protocol message. A second communication path transmits the HTTP protocol message to at least one URL.

A4 A method of communicating between a wireless device and an application program on an Internet Protocol server in accordance with another aspect of the present invention comprises sending a short message from the wireless device to the Internet Protocol server. The short message is routed using a wireless protocol message. The short

message is conveyed to the Internet Protocol server using an HTTP protocol POST message.

A mobile to HTTP gateway application in accordance with yet another aspect of the present invention comprises an SMPP relayer, a message director to process messages from the SMPP relayer, a poster collector to obtain at least one target poster, and a poster.

BRIEF DESCRIPTION OF THE DRAWINGS

Features and advantages of the present invention will become apparent to those skilled in the art from the following description with reference to the drawings, in which:

Fig. 1 illustrates an exemplary system adapted to push mobile originated (MO) messages to an IP (web) sever, in accordance with the principles of the present invention.

Fig. 2 depicts a mobile-to-HTTP gateway (MHG) as a 'black box' which is easily installed into existing systems to enable bi-directional communication between a mobile device and one or more IP servers within the parameters of standard protocol communications (e.g., SMPP and HTTP) between system elements, in accordance with the principles of the present invention.

Fig. 3 shows a message flow between the system elements shown in Fig. 1.

Fig. 4 shows software elements of an exemplary MO-HTTP Gateway (MHG) **100**, in accordance with the principles of the present invention.

Fig. 5 shows various classes in an exemplary embodiment of a MHG **100**, in accordance with the principles of the present invention.

Fig. 6 shows relevant portions of a conventional short message service network.

Fig. 7 shows a process of short message flow within a

conventional short message service network.

Fig. 8 shows a pending message delivery process in a conventional short message service network.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

The present invention provides a mobile-to-HTTP protocol gateway (MHG, or "MO Gateway") which translates between standard wireless protocol commands (e.g., SMPP from an SMSC), and an application server on the Internet (i.e., a "Web Server").

An MHG in accordance with the principles of the present invention allows any standard 2-way SMS capable handset to interact with specialized web applications. Using an MHG, it is no longer necessary for a user to launch a phone browser in order to access the services. Moreover, an MHG provides a simpler model than WAP for developing 2-way applications.

The disclosed embodiment of an MO-HTTP gateway uses the SMPP protocol. However, the principles of the present invention relate equally to other 2-way messaging protocols, e.g., ReFlex for 2-way pagers.

The MO-HTTP gateway provides a mechanism for developers to produce 2-way wireless applications using familiar Web-based tools and methodologies. The MO-HTTP gateway hides the details of communicating with the wireless network by interacting with applications using familiar HTTP posting. By adopting SMS and SMPP for its reference implementation, the MO-HTTP gateway avoids problems common to the WAP environment.

Utilizing an MHG in accordance with the principles of the present invention, a developer may create mobile applications using standard Web development tools, e.g., Java Servlets.

Fig. 1 illustrates an exemplary system adapted to push

mobile originated (MO) messages to an IP (web) sever using standardized equipment and message protocols together with an MHG **100**, in accordance with the principles of the present invention.

In particular, as shown in Fig. 1, a mobile (i.e., wireless) device **120** communicates with an appropriate wireless network **122** using any appropriate wireless standard protocol. In turn, the wireless network **122** communicates with a short message service center **124** using standard IS-41 communication protocol messages.

Appendix A attached hereto is a document entitled "SHORT MESSAGE PEER TO PEER (SMPP) INTERFACE SPECIFICATION" describing relevant features of mobile originated communications using Short Message Peer-to-Peer Protocol (referred to herein as SMPP).

The SMSC **124** communicates with a wireless internet gateway **126** via SMPP protocol commands in substantial conformance with the SMPP interface specification attached hereto in Appendix A.

A suitable wireless Internet gateway **126** is described in co-owned U.S. Appl. No. 60/___,___, filed on _____, 2000, entitled "Wireless Internet Gateway", by Richard Smith, the entirety of which is expressly incorporated herein by reference.

The wireless Internet Gateway **126** communicates with a MHG **100** using Java Remote Method Invocation (RMI) technology to provide server-to-server capability.

The mobile to HTTP Gateway (MHG) **100** translates standard format RMI protocol commands from the wireless Internet gateway **126** into HTTP protocol commands, and directs the same to an appropriate Internet protocol (IP) server (i.e., web application server) **152**, **154**, and/or **156** in communication with the Internet **150**.

Fig. 2 depicts the MHG **100** as a 'black box' which is easily installed into existing systems to enable bi-directional communication between a mobile device **120** and one or more IP servers **152-156** within

the parameters of standard protocol communications (e.g., SMPP and HTTP) between system elements, in accordance with the principles of the present invention.

In particular, as shown in Fig. 2, the mobile to HTTP gateway (MHG) **100** preferably is bi-directional in that it generates HTTP protocol POST commands to an application program on a relevant IP server **152-156** based on mobile-originated messages, and translates responses to the same from HTTP protocol back into standard format SMPP messages for forwarding back to the relevant mobile device **120**.

In accordance with the principles of the present invention, an HTTP protocol POST command is used by the MHG **100** to forward a request from the mobile device **120** to the relevant web IP server(s) **152-156**. The HTTP protocol POST command is well known and documented in, e.g., RFC2068 and later IETF RFC's on the subject. This document is publicly available, e.g., at http://ietf.org/rfc.html.

In particular, as is known within the HTTP protocol, an HTTP protocol POST command is used to request that a particular destination web IP server **152-156** accept the entity enclosed in the request (i.e., the mobile device **120**) as a new subordinate of the resource identified by the Request-URI in the Request-Line.

The HTTP protocol POST command is designed to allow a uniform method for various tasks, e.g., to allow annotation of existing resources, to allow posting of a message to a bulletin board, newsgroup, mailing list, or similar group of articles, to provide a block of data, such as the result of submitting a form, to a data-handling process, and/or to extend a database through an append operation. The actual function performed by the HTTP protocol POST method is determined by the particular web IP server **152-156**, and is usually dependent on the Request-URI. The posted entity (i.e., the wireless device **120**) is subordinate to that URI in the same way that a file is subordinate to a

directory containing it, a news article is subordinate to a newsgroup to which it is posted, or a record is subordinate to a database.

The action performed by the HTTP protocol POST command might not result in a resource that can be identified by a URI. In this case, either 200 (OK) or 204 (No Content) is the appropriate response status, depending on whether or not the response includes an entity that describes the result. If a resource has been created on the origin server, the response should be 201 (Created) and contain an entity which describes the status of the request and refers to the new resource, and a location header.

Responses to the HTTP protocol POST are not cachable, unless the response includes appropriate Cache-Control or Expires header fields. However, the 303 (See Other) response can be used to direct the user agent to retrieve a cachable resource.

With respect to the MHG **100**, the submitted HTTP protocol POST command includes mobile_num, resp_track_id and body fields. Also embedded within the HTTP protocol POST command is a CGI name/value pair providing information about the particular request from the mobile device **120**.

A response back to the mobile device **120** originates from the relevant web IP server **152-154** synchronously in response to the received HTTP protocol POST command.

Particular features of the standard SMPP utilized by various aspects of the present invention include the following:

- Use of a registered_delivery flag.
- Use of an "$R" trigger in the body of every MO message indicating a source-unique tracking number for SMPP v3.3, version 3.4 provides an explicit field for a tracking number and therefore the trigger is not required.
- Use of user responses contained within the stat component of a

standard delivery receipt.

- Use of message types identified by the esm_class field.

Fig. 3 shows an exemplary message flow between the system elements shown in Fig. 1.

In particular, the following steps 1 to 12 are depicted between system elements in Fig. 3 as an example of message routing between a mobile device **120** and a relevant web IP server **152-154**.

Step 1

The mobile device **120** sends a short message to a pre-defined address (e.g., 'info', or 4636). If the body of the short message is empty, or if the body contains a special string such as 'menu', then ultimately a menu would be sent by the HTTP Application on the relevant web IP server **152-156** to the mobile device **120**.

Other bodies may be used to, e.g., identify global commands, or provide context-sensitive information from the mobile device **120** to the HTTP application on the web IP server **152-156**. Requirements for body content depend on the particular HTTP application as it exists on the particular web IP server **152-156**.

Step 2

The SMSC **124** routes the short message to an ESME (e.g., the wireless Internet gateway **126**) for delivery using a standard SMPP protocol DELIVER_SM message. As disclosed, the MHG **100** utilizes the following fields of the DELIVER_SM command: service_type, source_addr, destination_addr, registered_delivery_flag, esm_class, and short_message.

In particular, the MHG **100** utilizes the service_type parameter to indicate the SMS application service associated with the

message. For instance, the service_type field may be populated with the value 'page'.

The source_addr is the address of the SME (e.g., mobile device **120**) that originated the short message. As disclosed, the source_addr is the Mobile Identification Number (MIN) of the mobile device **120** making the request.

The destination_addr is the address of the destination SME. As disclosed, the destination_addr may be assumed to be '4636' as indicated in Step 1 above. This address is used to route the request to the appropriate HTTP URL.

The registered_delivery_flag indicates if an SME Acknowledgement is necessary. As disclosed, the registered_delivery_flag is set to a default value of 0, which indicates that no delivery receipt is requested.

The esm_class indicates the message type and Enhanced network services.

The short_message field contains up to 254 octets of short message user data.

Thus, key fields of the DELIVER_SM command may be populated by the MHG **100** as follows:

service_type:	page
source_addr:	mobile's MIN
destination_addr:	4636
registered_delivery_flag:	0
esm_class	0
short_message:	$R[new ref id]$M[message]

The $R in the short_message is optional, and is applicable for use with SMPP v3.3. The $R may be used when correlating responses from the mobile device **120** to Reply-request messages from the application program on the relevant web IP server **152-156**. For

consistency, the $R is preferably always present in short messages from the mobile device **120**.

Step 3

When the wireless Internet gateway **126** receives the SMPP message from the SMSC **124**, it creates a DELIVER_SM object. The DELIVER_SM object is forwarded by the wireless Internet gateway **126** to any relevant remote applications that are registered to receive messages on a specified ports/link ID, e.g., the MHG **100** if the MHG **100** is registered with the wireless Internet gateway **126** to receive SMPP messages. The transmission is accomplished through an RMI callback mechanism.

Step 4

The MO-HTTP Gateway (MHG) **100** receives the DELIVER_SM message object from the wireless Internet gateway **126**, and formulates an HTTP protocol POST command message to a web server on the Internet **150** to convey the message content. The MHG **100** can direct the HTTP protocol POST command messages to one or to multiple URLs.

The particular web server to reference is determined by the included destination address, assuming that the SMPP destination address field contains the targeted number, e.g.,, '4636'. The HTTP protocol POST command message may be routed based on the SMPP port utilized.

As disclosed, exemplary name/values that may be utilized in the HTTP protocol POST command message sent to the web server are the mobile_num, resp_track_id, and body.

The mobile_num may be the mobile identification number (min) identifying the originating mobile number of the relevant mobile

device **120**.

The resp_track_id may be the reference ID (ref id) for user acknowledgements used to track questions and related answers.

The body may be the payload content from the mobile device **120** included in the message body field.

As embodied, by default, only SMPP messages with esm_class values of '0' and '16' are forwarded by the wireless Internet gateway **126** to the web IP server **152-156**. That is, only new mobile originated requests and/or menu responses are forwarded.

If, for instance, the SMPP message type is '16', then the resp_track_id variable may contain the reference ID. On the other hand, if the message type is '0', then the reference ID is not passed to the relevant web IP server(s) **152-156**.

Utilization of the SMPP message type and inclusion/non-inclusion of the reference ID reduces network traffic and resource requirements, and simplifies development on the web side.

Step 5

The relevant web server in the Internet **150** receives the HTTP protocol POST command information, which may be handled by the actual CGI/Servlet routine specified by the URL in Step 4.

The handling servlet may create sessions for each mobile device such that the current state of the mobile device may be preserved, allowing meaningful content to be transmitted. Example wireless web applications may include menu-based services, games, and information services.

After the servlet of the web server in the Internet **150** receives the HTTP protocol POST command, the servlet synchronously returns data through the HTTP stream back to the MHG **100**. The text returned by the servlet may be delivered to the mobile device **120** as a

standard SMS message.

The returned data may be contained within an <SMS> and </SMS> tag-set. The <SMS> and </SMS> tags are special tags used by the MHG **100** to denote SMSC Type data. As the number and/or variety of applications increase, additional tags may be implemented.

As disclosed, there are several fields embedded within the <SMS> and </SMS> tags: mobile_num, resp_track_id, and body.

The mobile_num field includes a mobile identification number of the mobile device **120** that a relevant short message is destined for.

The resp_track_id field includes a unique identification number generated by the servlet. The MHG **100** returns this id to the servlet for responses.

The body field includes the text to send to the desired mobile device **120**. If the body field is blank, then nothing will be sent to the mobile device **120**.

If the servlet requires a single-button user response (e.g., for a menu), then the "<RESP_TRACK_ID value='x'>" tag can be included prior to the </SMS> tag. This tells the system that a menu is required and that the specified unique tracking number should be used.

When the user of the mobile device **120** responds to this message, this same tracking id may be returned in the resp_track_id cgi variable.

For ease of description of some of the following steps, an example using the scenario described above is introduced wherein the servlet returns the following:

<SMS> Do you like cookies (Y/N)?
<RESP_TRACK_ID value="1234"> </SMS>

Step 6

After having posted its data to the web server in the Internet **150**, the MHG **100** receives a response from the same connection, as described in Step 5. A standard SUBMIT_SM MT message is generated from the text received within the <SMS> tag set.

In particular, the SUBMIT_SM message is issued by the ESME (e.g., the wireless Internet gateway **126**) to submit a short message to the SMSC **124** for transmission to a specified mobile device **120**. In creating a SUBMIT_SM message destined for the SMSC **124**, the conventional SMPP Protocol specification is followed, with the exception of the following mapping implemented between the SUBMIT_SM message and data received in the <SMS> and </SMS>.

A registered_delivery_flag in the SUBMIT_SM message informs the SMS that the ESME (wireless Internet gateway) **126** requires a notification when the message has been delivered. If the RESP_TRACK_ID is provided (i.e., contains a value), then the registered_delivery_flag field is set to '8' for the MHG **100** indicating 'SME Manual/User Ack requested', and a special tag of R$[track id] is included in the message body. Preferably, this same tracking id will be returned in the response message from the mobile device **120**.

A short_message in the SUBMIT_SM message is the payload containing up to 160 bytes of data that should be transmitted to the mobile device **120**. An empty body indicates that no message is to be sent to the mobile. If the RESP_TRACK_ID value is set, then a special tag of **"$R"** concatenated with the value from the RESP_TRACK_ID and the tag **"$M"** must be prepended to the short message.

The other fields of the SUBMIT_SM message are used as conventionally known and described in the SMPP Protocol.

Step 7

The SMSC **124** receives the SUBMIT_SM message and delivers a short message, with manual ack request, to the mobile device **120**.

Step 8

The mobile device **120** responds to the "Do you like cookies?" question, e.g., by pressing '9' for Yes.

Step 9

The SMSC **124** receives the response from the mobile device **120** and formulates a DELIVER_SM message. The formulated DELIVER_SM message is forwarded to the wireless Internet gateway **126**.

Key parameters in the DELIVER_SM message may be populated as follows:

- service_type: page
- source_addr: [mobile's MIN]
- destination_addr: 4636
- registered_delivery_flag: 0
- esm_class: 16
- short_message: R1234$[Response Value]

The response code is shown directly after the $M value.

Step 10

The wireless Internet gateway **126** receives the DELIVER_SM message from the SMSC **124**, converts the DELIVER_SM message into an object, and forwards the DELIVER_SM message to any listeners (e.g., the MHG **100**). In the disclosed example, the MHG **100**

may be listening to the wireless Internet gateway **126** on a specified port, and therefore receive the DELIVER_SM message from the specified port.

Step 11

The MHG **100** receives the DELIVER_SM object, and determines if the esm_class is '16'. If so, the short message is translated by the MHG **100** and forwarded to its web listeners.

A URL is associated with either the SMPP link ports or the destination address through a configuration file of the MHG **100**. The MHG **100** therefore formulates an HTTP protocol POST command message to the appropriate URL(s).

As disclosed, the HTTP protocol POST command message may contain the following name/value pairs:

mobile_num=[mobile num]

resp_track_id=123

body=9

To ease the burden of the web developer, the MHG **100** may include the response code only for messages where esm_class='16'. Thus, if the esm_class is not '16', the response code need not be included. Regardless of how the MSG **100** receives it, it need pass only the response code in the body field.

Step 12

The servlet associated with the specified URL receives the HTTP protocol POST command message from the MHG **100**.

The servlet may retrieve a session object for the particular value of the mobile_num, and determines that it had just asked the mobile device **120** about a cookie preference.

The servlet may confirm that the query's tracking ID correlates to the resp_track_id value. Thus, the servlet knows that the

response at hand is in response to that question. Since the body contains the content '9' (or 'Y' or other suitable response), the servlet may rightfully conclude that the user of the mobile device **120** (who input the '9' response) likes cookies.

A conversation or communication between the mobile device **120** and an application on one or more particular web IP servers **152-156** may continue on as described in steps 1 to 12 indefinitely.

Fig. 4 shows software elements of an exemplary MO-HTTP Gateway (MHG) **100**, in accordance with the principles of the present invention.

In particular, as shown in Fig. 4, the software elements of the MHG **100** include an SMPPRelayer **402**, a MessageDirector **404**, a PosterCollection **406**, a Poster **408**, and a Servlet **410**.

In accordance with the principles of the present invention, one or more SMPPRelayers **402** will register as listeners to specified link IDs of the wireless Internet gateway **126**.

In message **421** shown in Fig. 4, SMPP messages are sent by the wireless Internet gateway **126** to the SMPPRelayer **402** of the MHG **100** as they are received.

In message **422**, the SMPPRelayer **402** forwards each message to a MessageDirector **404**.

In message **423**, the MessageDirector **404** retrieves a Poster **408** from the PosterCollection **406**, and then in message **424** tells the Poster **408** to process the SMPP Message.

In message **425**, the Poster **408** converts the SMPP Message into an HTTP protocol POST command request **425** to a specific universal resource locator (URL), and receives return results back in message **426**.

In message **427**, the Poster **408** returns the results back to the SMPPRelayer **402**, so that it will be sent to the mobile device **120**, as

depicted in message **428**.

Fig. 5 shows various classes in an exemplary embodiment of a MHG **100**, in accordance with the principles of the present invention.

In particular, as shown in Fig. 5, the MHG **100** includes a MOHGateway class **502**, an SMPPRelayer class **402**, a MessageDirector class **404**, a PosterCollection class **406**, and a Poster class **408**.

The MOHGateway class **502** defines "main()", and upon execution will create the SMPPRelayer class **402**, the MessageDirector class **404**, and the PosterCollection class **406**, assigning references to one another as appropriate.

The PosterCollection class **406** accesses a standard application resource class to determine the number of Posters **408** required, as well as the desired configuration of each Poster **408**. The PosterCollection class **406** creates the Posters **408** and provides references to the Posters **408** through a getPoster(SMPPMessage msg) method.

The SMPPRelayer class **402**, the MessageDirector class **404**, the PosterCollection class **406**, and the Poster **408** each receive an ILogger object for recording information.

While the invention has been described with reference to the exemplary embodiments thereof, those skilled in the art will be able to make various modifications to the described embodiments of the invention without departing from the true spirit and scope of the invention.